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A STUDY OF ALTERNATIVES FOR DISSEMINATING KNOWLEDGE AND PLANNING FOR CIVIL DEFENSE EDUCATION--AMONG SCHOOL AGE CHILDREN--12-14 YEARS

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13. ABSTRACT

This report is a study of the context for an effort by the Defense Civil Preparedness Agency (DCPA) to reach junior high school pupils with a civil defense curriculum. Our recommendations are backed by examinations of the current state of civil defense instruction in the public schools, of the content that would be appropriate for a new curriculum, and of the historical and theoretical background for the process of educational innovation. Five major alternatives are listed for a DCPA effort: 1. Produce a total civil defense program, K-12, to be offered to states and school districts at cost or below; 2. Produce a complete program for grades 7-9. 3. Produce a series of modules or mini-units that could be adopted independently and/or in conjunction with existing curriculum. 4. Develop curriculum frameworks, guides, and/or behavioral objectives, and/or tests. 5. Invest heavily in teacher training. In addition, several recommendations are offered in an Appendix for small-scale projects that could be incorporated into the major alternatives.

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Detachable Summary

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Five major alternatives are listed for a DCPA effort:

1. Produce a total civil defense program, K-12, to be offered to states and school districts at cost or below.
2. Produce a complete program for grade 7-9.
3. Produce a series of modules or mini-units that could be adopted independently and/or in conjunction with existing curriculum.
4. Develop curriculum frameworks, guides, and/or behavioral objectives, and/or tests.
5. Invest heavily in teacher training.

In addition, several recommendations are offered in an Appendix for small-scale projects that could be incorporated into the major alternatives.

Option three seems to represent the best course of action, especially because of its potential for immediate, visible success. As long as the decision to adopt a civil defense program rests with local school authorities, our research on the adoption process indicates that flexible, prepackaged units will be appealing by virtue of their simplicity, and could succeed where a more massive attempt to introduce a comprehensive program could fail.

An investigation of the present situation in the public schools of the United States indicates that civil defense instruction has had only a minor impact as yet. The schools have not been the target of a concentrated effort by the DCPA; programs are in a rudimentary stage of development. Almost nothing has been published on the subject, and the general public seems as apathetic as the educational theorists. Clearly, the concept of civil defense education will have to be "sold"; it is not being actively demanded right now.

Chapter II examines the content for a program that could be developed. Three broad levels of child development are considered, along with the differing curricular emphases they require: grades K-6, 7-9, and 10-12. The principal conclusion is that the adolescents of grades 7-9 can be particularly receptive to learning the practical skills necessary for survival in a disaster. However, our report stresses the recommendation that all levels must be considered, and a unified, K-12 curriculum

should at least be developed in a theoretical way. This chapter also presents sample objectives, demonstrating a way to prepare courses.

The process of introducing an innovation, such as a new course, into the educational system is discussed in Chapter III. While the recent history of schools in the United States shows an impressive pace of change, it cannot be stated that changes are easily effected, We have summarized research literature which has isolated factors that make an innovation more or less welcome to its adopters. These include, on the positive side: divisibility, communicability, compatibility with the receiver system, and relative advantage; on the negative side is complexity, with all its ramifications. The experience of successful innovators suggests that potential users be heavily involved in the development process for a new product.

Finally we present our list of recommendations.

INTRODUCTION

This report describes our study of alternative goals and plans for introducing a program for civil defense readiness in grades 7-9 in public schools in the United States. Our first conclusion was to suggest that the job could not be done unless a multi-million dollar, multi-year plan were put into effect. We still believe a project on such a scale will be required to completely achieve the goals of the Defense Civil Preparedness Agency (DCPA).

As we studied the context for a commitment of this magnitude, however, we realized that other conclusions might be warranted. To put the matter directly: DCPA needs a small-scale, successful experience soon if it is going to move into a much larger program. Apparently people in DCPA have been told so many times that the problems are overwhelming, the costs will be large, etc. that they find it difficult to know how and where to begin. Hence, the major recommendation of this report is that a small "mini" unit be developed that has considerable flexibility for a 7-9th grade program. This unit should be carefully field-tested to insure that it meets the objectives set; it should be installed in several school settings, and its use should be evaluated and reported carefully. This is no small task in itself, but it would provide what we believe is most needed now: a demonstration that civil defense instruction can be achieved in grades 7-9.

To implement our suggestion, we recommend that a three-stage project be funded. The project could be spread over several years, but if an early success story is wanted, the project could be compressed into a period of about one year. The phases and approximate funding are as follows:

Phase I: Develop 3 or 4 prototype units and perform a market test to decide which is most feasible. (About 6-8 months; $50-60,000)

Phase II: Perfect the selected prototype into an operational form and test it for its effectiveness; probably the tests will be successful and little or no revision would be required. (About 6-8 months; $75-80,000)

Phase III: Place the unit into selected operational settings and monitor the outcomes; prepare a report and recommendations for DCPA. (About 7-10 months; $40-50,000)

This effort to produce a success story should not diminish the obstacles that genuinely face any agency or group that wants to have impact on schools in the United States. For example, the National Science Foundation spent about 50 million dollars to create three new elementary science programs. Countless additional dollars were spent in dissemination, installation and training. Now, after about a decade, they are beginning to "make it"; current estimates suggest that both the NSF developed programs and their successful imitators are reaching about one fourth of the elementary schools.

The main problem is that the schools aren't a single system; they are hundreds of systems that are extraordinarily difficult to change. Only a major, large scale systems effort will bring about the desired effects. Certainly there are "quick and dirty ideas" that could be implemented that would look attractive and provide political visibility. Our study and experience suggests that they won't get used for the most part, that instead they'll sit on shelves and gather dust.

It will even be difficult for the DCPA to couple its objectives with

those involved in changes that can already be projected for schools in the next decade. Two things brought this point home to us as we were midway through the study: an interview we had with the developer of a new middle-schools' curriculum (see Clark, 1969) and the freezing of the Office of Education's "Renewal Program." Early in our work we had intended to recommend these two efforts as major changes that would be hitting the schools soon. We thought that if civil defense material went into these two projects, some of the Agency's goals could be met. The middle-schools curriculum project (Clark, 1969) would have reached the grade level targeted for the study. The curriculum project was funded by the National Science Foundation and was being developed by the Biological Science Study Council. As we explored the program in more depth, however, we realized that the obstacles were great. The National Science Foundation had not funded the project as heavily as before, it was in an innovative, cross-disciplinary area, the target audience was less definable, and the schools' money for this kind of program had suddenly dried up. In short, everything was going against it despite the high appeal of what was being done. We realized that if we were to recommend this or other projects to the DCPA, the real problems would not be solved.

We were also going to recommend that the DCPA couple its efforts with the renewal strategy that the Office of Education was promoting. USOE intended to spend millions trying to get schools to change their entire instructional program. What better place could there be for civil defense? And then, under orders from the upper echelons of government, the pressure against this kind of change caused USOE to call off the whole plan (NSPRA, 1972). And then we remembered the sad history of the Elementary and Secondary Education Act (ESEA) titles, like the "compensatory" programs (Title I) and the innovation programs (Title III). How foolish to lead the Defense Civil Preparedness Agency down the primrose path!

As a result, the long-range alternatives we recommend are all major, expensive, systems developments. These programs would have to look at the total picture, including the delivery and utilization problems. If the projects use good management techniques and Operations Research (OR) based on empirical development, they can succeed; or at least they can be closed down with a knowledge of their certain failure before large amounts of money are expended. The second chapter defining the "content" of a course in civil defense suggests the first step in this direction.

Chapter I is a rather perfunctory one; it is perhaps a too honest estimate of the lack of activity in the public schools in the area of civil defense. We had intended to do more study in this area. We had thought that a careful inspection of existing curricula would yield a more optimistic picture. Every way we turned suggested that there was no way we could make the proverbial "silk purse out of a sow's ear." We could not even defend spending more resources validating this conclusion because we were 90 percent certain we were right, based on the data collected.

Chapter III reflects a very cursory summary of our study of the literature of educational change and of our conversations with people who have been successful and unsuccessful at it for the past few years. Chapter IV pulls together the alternatives we recommend. The reader will clearly see that we think option 3 is the most viable. In fact, we recommend that it be started now, on a small scale, as proposed in the three-phase project mentioned above.

I. The Status of Civil Defense Education Today

An examination of Civil Defense (CD) education in seven states reveals a kind of "hodge-podge" from which it is difficult to make generalizations, but which does yield some conclusions: In practice, CD education, since it is cross-disciplinary, has been fragmented into various subject areas, and receives varying degrees of attention, depending upon the point of view of a teacher or the pressures exerted by an administrator. A few states have laws making CD education mandatory, but these laws do not specify the extent of the education and they fail to provide adequate curricular materials. Some states have policies that suggest strongly that CD instruction be offered, but the predominant pattern is that school districts are free to include it or ignore it as they see fit. In general, the situation in the schools reflects the fact that only recently has attention been focused on CD education below the adult level.

In mid-April, 1972, telephone discussions were conducted with the state CD directors in Alabama, California, Florida, Kansas, Minnesota, Oregon and Texas. The topics covered with each director included: grade levels for CD education at present, approximate percentage of students being reached by a program, instructional materials in use, teacher training activities being conducted, and degree of success apparently being achieved (for instance, as measured by a testing program). CD directors were also asked whether the program was mandated by state law, whether it might in the future be so mandated, what impact a change in federal funding level might have, and where, in a general sense, the state's program seemed to be going.

The seven directors were most cooperative; they were pleased to be consulted, and some of them subsequently wrote to us, offering their help for whatever new effort might develop out of this investigation. The following information was extracted as a consensus of their comments.

1. When CD education is taught as a separate course, it is at the high school level.
2. CD education is just beginning to receive attention at the elementary and junior high school levels.
3. CD education is generally "integrated" into science, social studies, P.E., or health and safety at the elementary and junior high school levels.
4. The quality of CD education currently varies from poor to good.
5. Overall, the number of children receiving CD education is very low, perhaps less than ten percent.
6. Some states are beginning to think of CD as a K-12 program, but no program has been fully developed to date.
7. CD education seems to exist only because it is federally funded. All directors felt the program would be discontinued with the discontinuance of federal funds.
8. There is practically no evaluation associated with CD education beyond the informal observations of CD staff members and participating teachers.
9. Most of the materials used for teaching CD are those that have been developed for adults by the Office of Civil Defense (OCD).

These materials do not exploit the newer approaches to learning such as inquiry or discovery methods, concept learning, and actual practice of the skills to be learned. Instead, the materials are generally a set of rules to be memorized, followed by factual test questions; the process is thus restricted to the lowest cognitive level--recall.

10. The desired results of CD education are usually expressed in terms of goals, although a few states are beginning to develop performance objectives for their students.

11. There appears to be general agreement that CD education should logically cover both natural and man-made disasters; as a result, the OCD materials have been supplemented by materials derived from other governmental agencies (the weather bureau, for example) and materials that have been self-generated where money was available.

12. It is evident that considerable duplication of effort is occurring in developing objectives, teaching materials, and teacher's guides.

13. Although there is general agreement that attention should be given to affective and psychomotor, as well as to cognitive, objectives, most of the instruction involves only the cognitive domain, a situation that is probably related to lack of materials and course development.

Clearly, the process of further extending CD education in the schools will benefit from a good deal of planning and coordination.

In addition to investigating the practical level of "what's going

on in the schools," we made three document searches to determine the nature of the thinking on more abstract levels. (See Appendix B for a list of the references yielded by the searches.)

1. The Defense Documentation Center provided a bibliography which, although containing valuable information, was essentially oriented toward nuclear attack problems, adult training programs, and the administration of CD; therefore, the references would not prove particularly useful in planning an education program below the adult level.
2. A search of ERIC and the Education Index revealed that professional educators, if they are thinking about CD at all, are not writing about it. Of the three entries in the Education Index from 1967 on, none was related to CD education in the public schools.
3. The Rand Corporation has compiled "Civil Defense: A Bibliography of Selected Rand Publications." However, of the one book, one report, 32 Rand memoranda, and 21 papers listed, none pertained to educational programs in the United States.

Some miscellaneous investigations point up the difficulties that confront CD education. The Public Attitude Study (Garrett, 1971) reported by the OCD confirms that the public has little interest in CD and that fear of nuclear attack is declining. Perhaps people tend to be fatalistic about nuclear bombs. If one falls anywhere near you, it is all over, so why worry? If one falls 50 miles away, it won't hurt you, so why worry? But the most interesting result of this study is that only five percent of the population associated CD with natural

disaster preparedness (Cohen, 1970). Today natural disasters are endemic and everyone believes in preparedness to some degree. Our conclusion is that the best way to introduce nuclear attack preparedness instruction into the curriculum is by catching the shirttails of natural disaster.

When pinned to the wall, most people will admit that the ability to survive a disaster is important, but in practice they tend to regard the traditional disciplines and skills as having more significance in the curriculum. In general, though no one argues against CD, few are willing to support it. The fact that a sizable part of the sample of the Public Attitude Study (Garrett, 1971) said that CD had "no personal meaning" to them may indicate that they don't know enough about CD for it to be meaningful, or that what they remember of CD publicity is no longer meaningful, or that they regard nuclear attack as a hopeless situation or a situation too remote. In a recent article in Psychology Today (Quarantelli and Dynes, 1972), the authors indicate that group resources such as the Red Cross and others are the last to be called in a disaster. The threatened one tries first to act independently, then calls on family, neighbors and friends, and finally relies on community groups. Of course this is also the natural sequence of events; one could hardly expect it to be otherwise.

Therefore, the introduction of CD education of any quantity and quality into the public schools is going to be a major challenge.

II. The Nature of Civil Defense Education

In the past, the CD education effort has been focused primarily on nuclear attack; today, however, there appears to be a shift in emphasis toward including both man-made and natural disasters. The following statement from Civil Defense and the Public indicates this broader point of view.

> "There is presently a new emphasis in (civil) defense programs at the Federal level. This is a return to emphasis in increasing basic emergency operations capabilities from which civil defense was deflected in the late 1950's by a focus on the development of a national fallout shelter capability. In this program an effort will be made to develop emergency operations plans to cover peace-time emergencies, increased readiness at the time of international crisis and nuclear attack. It will involve (1) creation and improvement of Emergency Operating Centers, (2) upgrading warning and emergency communications, (3) provision of emergency power, (4) improve emergency information systems, (5) better use of modern management tools, (6) more use of Emergency Operations Simulations, (7) greater concern with everyday emergency services of government (8) advanced training, (9) greater inclusion of civil defense in the schools, (10) greater attention to dual use capabilities of civil defense facilities and systems, (11) more timely dissemination of guidance to state and local governments, and (12) stimulation of voluntary assistance from business, industry and voluntary associations." (Garrett, 1971, pp. 8-9)

From this document one may extract the goal: to save as many lives, as much property, and as many natural resources as possible when people are threatened by or subjected to man-made or natural disasters.

We have examined a wide range of disasters: flood, fire, earthquake, explosion, epidemic illness, wind storms, pollution, weather extremes, riot and civil disobedience, crime, drug abuse, and war (conventional, nuclear, chemical, and biological) for possible inclusion in a CD education program.

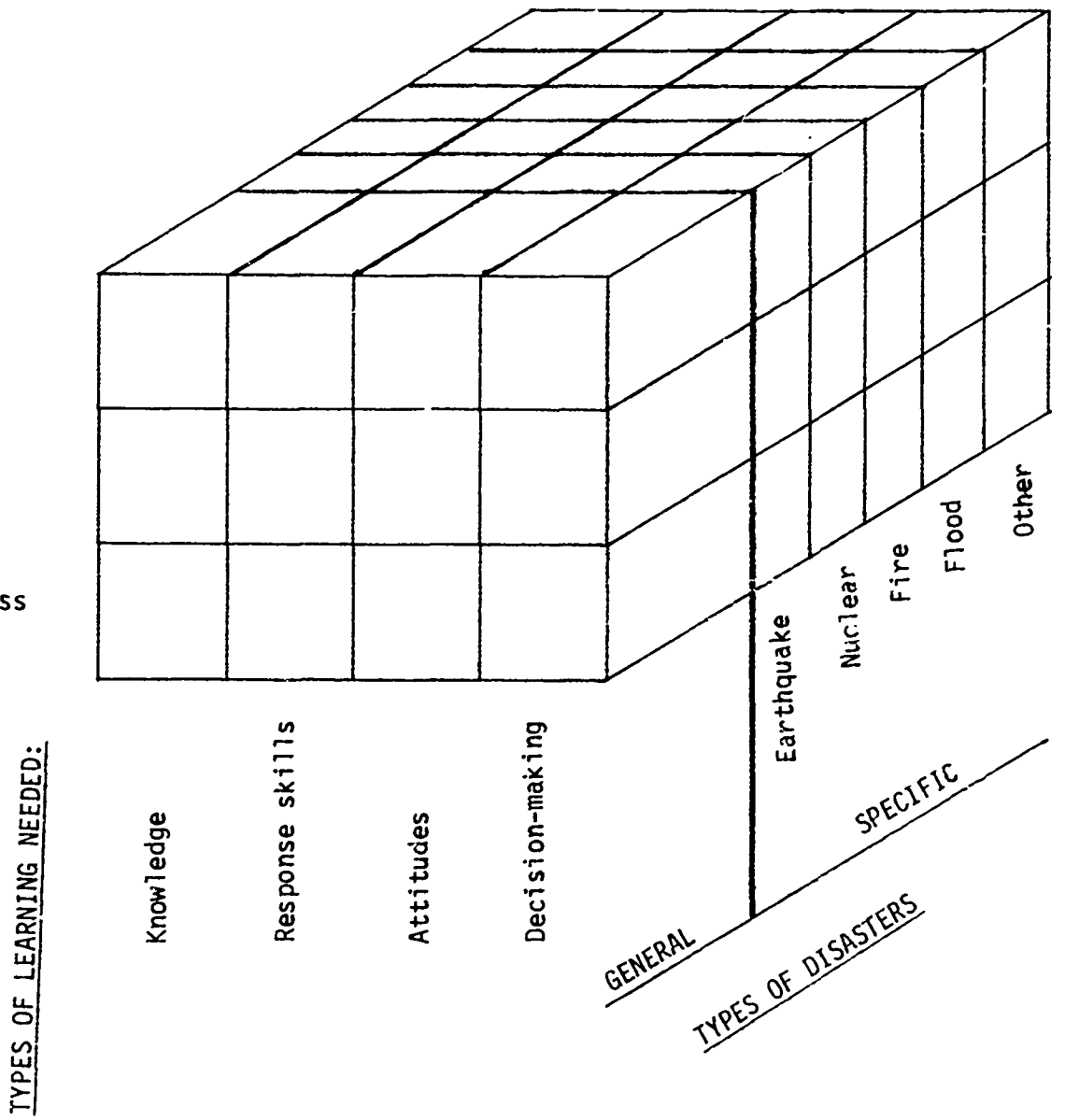
In addition, we have examined the OCD publications for adults and children and research documents (Publications Index, 1970). We have looked at the Staff College Units (Home Safety, 1971) and materials published by the U.S. Department of Commerce/Environmental Science Services Administration (President's Council, 1969). Also reviewed were joint efforts of OCD and the PTA (N.C.P.T., 1969); OCD and the National School Board Association (Lamers, 1965); and OCD and the American Association of School Administrators (A.A.S.A., 1966).

We have examined the content now assigned to CD education. Most of the printed materials contain factual information, sets of rules, procedures for emergencies, advice on preparedness; some materials include quizzes on the information presented.

As we have searched the above material, we have tried to define the "content" of civil defense. At the present time, we believe that there are at least three ways of defining the content. First, one can, in a narrative text, describe the facts that constitute the knowledge considered necessary for civil defense preparedness. We have not presented these facts here, because the Laboratory recently com-

pleted another contract with the Office of Civil Defense in which the content is described. (See the new text, Your Chance to Live [Hutchins, et al, in press]). The deficiency in this approach for the current planning effort is that describing the content "to be covered" by a course or program is not a very satisfactory way to describe what the outcomes of such a program should be--stated in terms of student performances. Hence, later we shall outline in detail sample areas in which objectives should be written. Even a complete set of behaviorial objectives would not be an entirely satisfactory means of describing the content of a course for grades 7-9, however; we present instead a conceptual plan or matrix (Figure 1) which tries to bring together knowledge, skill, and subject-matter domains.

Figure 1


STATES OF EMERGENCY:
1. Prevention
2. Prediction
3. Preparedness
TYPES OF LEARNING NEEDED:
Knowledge
Response skills
Attitudes
Decision-making
GENERAL
SPECIFIC
TYPES OF DISASTERS
Earthquake
Nuclear
Fire
Flood
Other

States of Emergency

When we look at disasters from the standpoint of the "state of affairs," three conditions emerge: prevention, prediction, and preparedness. All three do not apply to all disasters; earthquakes, for example, still seem resistant to both prevention and prediction. But certainly the understanding of and the ability to function in these conditions (prevention, prediction, preparedness) are critical for survival.

Types of Learning

Looking at disasters from the standpoint of being able to function in these three "states of affairs," we find four common denominators: knowledge (information), attitude, response skills, and dissemination skills. In some cases, pure knowledge (knowledge of the nature of combustion, for example) is sufficient; in others, pure skill (such as being able to run fast) is quite adequate. But in most, a combination of knowledge and skill is required. Usually the knowledge is scientific in nature, although some stems from the social area. The knowledge and skills required for preparedness in some cases differs markedly from those required for prevention and again from those required for prediction. There are other groupings possible. For example, there is a set of basic survival skills that is common to many disasters and a set that results from being temporarily homeless. Attitudes are also important in insuring that knowledge and skills will be learned and applied at appropriate times. Yet another common learning element appears to be the delicate matter of decision making: given the hazard and a knowledge of conditions and possibilities, what does one do? One

could think of decision-making as a skill, but its uniqueness is so critical to effective action in emergency settings that we believe it should be treated separately.

Types of Disaster

Finally, the "content" of civil defense can be defined in terms of the type of disaster involved. In addition to the treatment of specific emergencies such as earthquakes, floods, fires, nuclear disasters, etc., we believe there are also situations in which the learning to be accomplished crosses over from one area to another. We have defined these crossover areas as "general" areas in which knowledge, skills, etc., are to be defined.

If the detail in this matrix (Figure 1) were completed, it would present, we believe, an adequate definition of what a civil defense program, including one for grades 7-9, should contain. We would recommend that if a large-scale curriculum development emerges, the work of completing the detail should be undertaken.

A. A Program for 12-14-Year-Olds in the Context of a Program for Children of All Ages.

The matrix presented in Figure 1 does not, of course, completely define the content of a civil defense program for children between the ages of 12 to 14. It provides only a conceptual framework for developing a content definition. Before we can complete the work of defining a program, however, another problem must be resolved: where would a program for 12-14 year-olds fit into a comprehensive civil defense program for children of all ages? We present the following discussion,

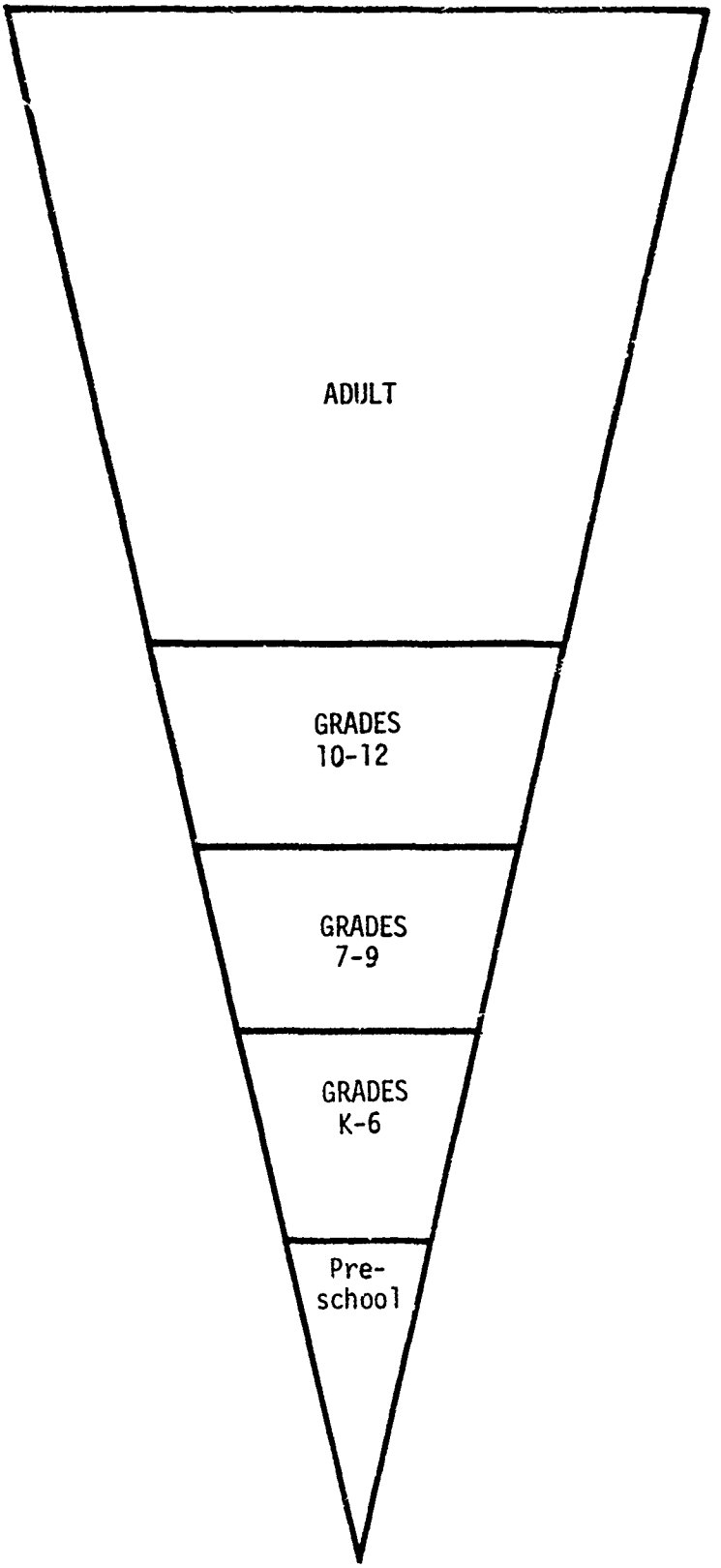
although our current contract calls only for a plan for children in grades 7-9. We believe that it is unwise to consider one age group to the exclusion of other ages, since civil defense education must be a long-range program. In other words, it would be unwise to place curricula in the junior high that might be far more suitable to another age level or to try to carry out the complete civil defense educational program at a single school level. Therefore, we have taken a quick look at a K-12 program so that we can suggest the program for grades 7-9 within the K-12 context. (See Figure 2.)

To provide a base for our model, we have tried to consider the changing levels of students' social, physical, and intellectual maturity (see, e.g., Singer and Singer, 1969). We believe this design is likely to sustain student interest and to product a functioning member of society any time in his life that a disaster might occur.

The program suggested calls for three levels of learning: threshold, comprehensive, and intensive. At the threshold level, only beginning skills and knowledge are offered; at the comprehensive level skills and knowledge needed to cope with disaster are provided. During the intensive level, a high level of performance is achieved. At each succeeding level, the preceding level(s) are reviewed where appropriate.

Citizen's Developing and Increasing Responsibility and Participation in Civil Defense

Figure 2



Below is a brief survey of the three levels: kindergarten-grade 6, grades 7-9, and grades 10-12. Each level consists of statements of pupil characteristics followed by suggested curricula in terms of degree of emphasis and depth (i.e., threshold, comprehensive, and intensive).

K-6

The K-6 child is for the most part under the protection and guidance of the family unit. He is curious, limited in knowledge, and exposed to a variety of hazards. As he grows older, his knowledge base increases and his social skills improve, but social organization is beyond his interest. His reading skills are rather limited during the primary stage, but adequate for some purposes in the upper grades.

Grades 7-9

The student in grades 7-9 is already at or in incipient puberty, is eager to stand on his own feet, is interested in his changing self, is scandalously experimental (particularly with combustion), is wild to travel, is interested in other geographical areas, is interested in science, and is aware of the community service structure. He is in possession of the basics of language, mathematics, and the social complex.

Grades 10-12

This age group feels social awareness in all its ramifications, often with a fervent desire to alter the social structure. The teenager can't understand why society is in such a state of deterioration and wants to reorganize it. He is capable of all the fine points of

cerebral activity and is able to understand problems that are remote--historic or futuristic.

B. Curriculum Outline for Grades K-12

In view of the characteristics of the students and the nature of the subject matter, the following civil defense education curriculum outline has emerged:

K-6

Threshold: He should have a threshold awareness of the existence of public disaster and of organizations in society dedicated to coping with them. He should be aware that a disaster does not always call for the same responses, that choices (decision-making) have to be made.

Comprehensive: He should have a general knowledge of local assistance groups and how to summon them. He should know that some disasters are natural and some man-made.

Intensive: The intensive aspect of the curriculum should consist mainly of the basic rules of safety and health, with increased emphasis in the upper elementary grades upon where to get help. Since so many personal disasters impinge upon him, he should receive training in fires, pedestrian safety, falls, water, play accidents, ingestion (i.e., what to and what not to put in one's mouth), etc. In a sense, this kind of disaster training is defensive.

For implementation of this type of program, emphasis should be placed upon the listening skills: the art of following directions.

Instructional media should consist of the recorded voice as well as the immediate human voice, since in an emergency information would be transmitted over the radio and TV. Efforts should be made to develop an attitude of cooperation. All of the above training should be in the context of the home and the community.

Grades 7-9

Threshold: On the threshold level the student should have some cognizance of social action in relation to social problems and government structure. He should know something about wars, their causes, and their implications for individuals and societies. He should have some knowledge of the effects of disaster on individuals and groups, and develop some knowledge of what to look for and do in the field of human relations.

Comprehensive: He should be aware of all types of disasters, where and under what conditions they are likely to occur, and the scientific principles related to their incidence and control. He should have a comprehensive knowledge of the agencies (national, state, and local) that concern themselves with disaster.

Intensive: The "Tom Sawyer" quality of the adolescent makes him ideal for the practice of personal survival skills--coping with extreme heat or cold or high winds; knowing how to build a fire, construct shelters, prepare and test foods and water, etc. He should understand and be able to apply the scientific principles that underlie

his experiences. He should understand the differences between preparedness and prevention, recognize disaster warning signals, and know the actions possible in the event of an emergency. He should be able to verbalize his reasons for reaching a decision, point out the variables, weigh chances, and explain the reasons for the action chosen.

Implementation of the grades 7-9 program is facilitated by the fact that most intermediate schools are departmentalized and have teachers specializing in particular fields who can be called upon, either as individuals or in teams, to assist with science, health, or governmental concepts. Further, many of the survival skills can be practiced in connection with physical education and recreational activities. The study of prevention and preparedness and of community agencies would logically be emphasized when "government" is the principal social studies content.

It should also be noted that children at this age have been found to have more positive attitudes toward civil defense than older teenagers (Greenberg, et al., 1968). They may, therefore, represent an especially suitable "target audience" for a pilot DCPA program.

Grades 10-12

Threshold: The student's level of maturation and his repertoire of academic and physical skills, plus the Civil Defense education he has received in the past, leave no place for thresholds. He should be well inside the "door."

Comprehensive: Comprehensive studies might include comparative disaster study (i.e., how other countries cope with

disasters). Students might also investigate the possible application of new scientific discoveries to disaster prediction, prevention, and control.

Intensive: The science and practice of personal survival skills should be continued with greater emphasis on the variables involved in a disaster and the attendant problem of decision-making. Teenagers should study the causes and results of man-made disasters such as crime, civil disobedience, war, and pollution. Special emphasis should be placed upon the civic aspects of disaster--the role of the citizen in preventing and coping with disaster, the legal aspects of disaster, the responsibility of the group, and how to achieve group action. Teenagers should receive intensive training in the social and verbal skills needed for participation in group action. While still in high school, students should participate in local action groups committed to the prevention of or preparedness for natural or man-made disasters. Implementing the grades 10-12 program presents no problem as far as subject matter is concerned because the school staff consists of specialists. Special emphasis, however, would have to be placed upon arranging a setting in which each student could actively participate in a decision-making group. In most cases, cooperation could be obtained from existing groups, school boards, Civil Preparedness units, service clubs, etc.

Obviously the foregoing is global and thus sins unconscionably in generalizing; there is a vast difference between a kindergartener and a sixth grader, and there can be vast differences between individuals of the same age. In the final planning, provisions will be made for these differences. Nonetheless, we feel that this overview is necessary because it indicates the flow of instruction, where emphasis will be placed, and where learning will be reinforced. We believe that a program of this type--some of it direct, some of it indirect, all of it related, all of it building on the past, all of it embedded in other disciplines--will produce a student not only better able to cope with disaster, but in possession of a realistic (one might even say, constructive) attitude toward disaster.

C. Sample Education Goals and Performance Objectives for Grades 7-9.

Another way to define the content of a civil defense program for children between the ages of 12 and 14 is to define objectives--statements of a general nature as well as specific, performance-based outcomes. The statements that follow are general goals for civil defense education in grades 7-9. They are followed by performance objectives for the study of fire, nuclear war, and earthquakes. We would have liked to develop performance objectives for all possible topics, using the matrix in Figure 1. As the reader will easily see, however, the work involved will be extensive. If someone were to actually undertake the writing of a program, he would have to complete that process. Meanwhile, the examples given should provide the reader with an adequate model of how general goals can be converted to performance objectives.

The general civil defense goal, as we understand it, is to save as many lives as possible in the event of natural or man-made disaster. More specifically, curriculum materials and learning experiences designed to meet the general goal should provide opportunities for the student to:

1. Respond intelligently and efficiently when a disaster (crisis) occurs.
2. Develop a scientific knowledge base for such natural hazards as water, fire, earthquake, explosion, disease, wind, pollution, and extreme heat and cold.
3. Develop a set of actions, based on the above hazards, that utilize scientific principles (knowledge).
4. Develop a set of actions based on scientific principles (knowledge) considering local constraints and conditions.
5. Perfect the set of personal survival skills needed for each hazard.
6. Develop a set of human relations skills needed during a disaster experience that involves a group of people.
7. Develop skills necessary to examine the environment, predict potential problems, and plan for prevention of hazards.
8. Learn about the roles of local, state, and national government in prevention of and preparedness for disaster.
9. Develop background for, and then practice, making decisions on actions to be taken during a disaster.

As we indicated, these general curriculum goals can be further defined by stating performances (acts or behaviors) a student should complete upon finishing the appropriate civil defense course or unit.

In curriculum design these performance indicators or outcomes should be stated even more precisely as "behavioral objectives" (Mager, 1962; McAshan, 1970). A behavioral objective includes a statement of the observable behavior expected, the conditions under which the behavior is to be observed, and a standard that marks successful achievement. We have not been able to specify a complete set of behavioral objectives for a grades 7-9 civil defense program; we have not had time or resources to outline performance in all of the areas suggested by the matrix presented in Figure 1. At this point such detail is unnecessary. However, the following content outline will give the reader an understanding of some of the detail that should be attended to if an adequate curriculum design is to be undertaken:

SAMPLE CONTENT FOR A GRADE 7 UNIT ON FIRE

KNOWLEDGE OBJECTIVES

1. The student will recall and/or recognize knowledge of the following science facts and principles:

   Factors necessary to produce fire (Victor, 1965).

   A. For burning to take place, three things are needed: fuel, oxygen, and heat.
   B. A fire needs a material that will burn, which is called fuel.
   C. A fire needs oxygen.
      1. Oxygen is one of the gases in the air.
      2. The more oxygen a fuel gets, the faster the oxidation will take place, and the hotter the fire will become.
      3. Supplying the fire with more air will give the fuel more oxygen.
      4. Breaking the fuel into small pieces will expose more of the fuel's surface to the air, and in this way give the fuel more oxygen.
      5. If a fuel is broken up into pieces so small that the pieces look like particles of dust, the fuel may combine with the oxygen so quickly that it will produce an explosion.
   D. A fire needs enough heat to get the fuel hot enough to burn.

1. Some materials burn more easily than others.
2. We say that these materials have a lower kindling temperature.
3. The kindling temperature is the lowest temperature at which a material will catch fire and burn.
4. At this temperature the oxygen will combine quickly enough with the fuel to keep the chemical reaction going steadily.
5. Materials like phosphorus, sulfur, and paper have a low kindling temperature and burst into flame easily.
6. Materials like wood and coal have a high kindling temperature and must be quite hot before they will burn.

E. Fire produces a flame.
   1. A flame is a mass of burning gas.
   2. Some fuels produce a flame directly, but other fuels must be partially changed into a gas before they can burn with a flame.
   3. A gaseous fuel, such as natural gas, burns directly to produce a flame.
   4. A liquid fuel, such as gasoline or kerosene, must be heated until it turns into a gas before it can burn.
   5. Some solid fuels, like paraffin, first melt and then turn into a gas before they can burn.
   6. Other solid fuels, like wood and coal, when heated will give off gases that burn.

F. The color of the flame depends upon how much oxygen the fuel is getting.
   1. When a fuel gets all the oxygen it needs and burns completely, the flame is blue and is very hot.
   2. When a fuel does not get enough oxygen to burn completely, the flame is yellow or orange and is not as hot as the blue flame.
   3. The flame is yellow because the particles of unburned fuel are glowing.

G. A candle flame has three parts to it.
   1. The center of the flame around the wick is dark, showing the presence of unburned gas.
   2. Almost all the rest of the flame is yellow, which shows that the gas is burning but is not getting all the oxygen it needs.
   3. Around the edges the flame is blue or colorless, which shows that the gas is getting all the oxygen it needs and is burning completely.

H. Fire produces water vapor and carbon dioxide or carbon monoxide gas.
   1. Most common fuels contain the chemical elements carbon and hydrogen.
   2. When the fuel burns, the hydrogen combines with the oxygen to form water vapor.
   3. Water vapor forms instead of liquid water because so much heat is given off during the burning.

4. When the fuel has all the oxygen it needs and burns completely, the carbon combines with the oxygen to form carbon dioxide gas.
5. When the fuel does not get enough oxygen, the carbon combines with the oxygen to form carbon monoxide gas instead.
6. Carbon monoxide gas is made up of less oxygen than carbon dioxide gas.

I. Smoke is unburned fuel.
   1. Smoke is made up of particles of carbon that did not receive enough oxygen to make them burn completely.
   2. When smoke collects on walls or in chimneys, it is called soot.

J. Some fuels leave behind an ash, which is part of the fuel that does not ordinarily burn.

K. Sometimes materials burst into flame all by themselves.
   1. This phenomenon is called spontaneous combustion.
   2. Spontaneous combustion takes place when a slow oxidation is going on in a closed space where the aire cannot circulate or escape.

L. An oily rag in a closed closet can often burst into flame by spontaneous combustion.
   1. The oil combines with oxygen, or oxidizes slowly and gives off a small amount of heat.
   2. This heat cannot escape because the closet is closed and there is no movement of air to carry the heat away.
   3. The heat makes the oil combine with oxygen more quickly, which cannot escape and so makes the oil combine with oxygen even more quickly.
   4. This process goes on and on, producing more and more heat until the kindling point of the cloth rag is reached, and the rag bursts into flame.

M. If green or wet hay is stored in a barn, spontaneous combustion may take place because the damp hay ferments and gives off heat.

N. Incendiary effects can result from the ignition of paper, trash, window curtains, awnings, excelsior, dry grass and leaves.

Factors necessary to put out fire.

A. To put out a fire, we must take away one or more of the three things needed to make a fire.
   1. We can remove the fuel.
   2. We can cut off the supply of oxygen.
   3. We can cool the burning fuel, making its temperature lower than the kindling point.

B. The most common method of putting out fires is to try to cut off the supply of oxygen and lower the temperature.

C. Removing the fuel is practical only with a small fire such as a campfire or a fire in a waste basket.
D. The supply of oxygen can be cut off by using sand, dirt, a heavy wool blanket or coat, water, carbon dioxide gas, or any other material that will not burn.

Fire Extinguishers

A. Fire extinguishers use chemicals to put out fires by cutting off the supply of oxygen and by cooling the burning fuel.
B. The soda-acid fire extinguisher, when turned upside down, mixes two chemicals together to form carbon dioxide gas.
   1. The carbon dioxide gas smothers the fire by cutting off the supply of oxygen.
   2. This type of extinguisher has water in it, and cannot be used to put out oil fires because the water is heavier than oil and sinks to the bottom while the burning oil floats and even spreads out further on top of the water.
   3. This type of extinguisher also cannot be used to put out electrical fires because the solution of chemicals in the extinguisher is a good conductor of electricity.
C. The carbon dioxide extinguisher is used for putting out oil and electrical fires.
   1. The extinguisher has compressed liquid carbon dioxide in it.
   2. When the liquid carbon dioxide goes out of the extinguisher, it turns into large amounts of very cold carbon dioxide gas.
   3. The carbon dioxide gas puts out the fire by cutting off the supply of oxygen and by cooling the burning fuel.
D. The carbon tetrachloride extinguisher is also used to put out oil and electrical fires.
   1. Liquid carbon tetrachloride is pumped out of the extinguisher.
   2. The flames heat the liquid carbon tetrachloride and turn it into a heavy blanket of gas, which pushes the air away from the fire and smothers it.
E. The foam-type extinguisher is very effective against gasoline and large oil fires.
   1. It works very much like the soda-acid extinguisher, but it also has a foam-making material such as licorice extract in it.
   2. When the extinguisher is turned upside down, the chemicals mix together and produce a tough foamy mass of carbon dioxide bubbles.
   3. This foamy mass of bubbles covers the burning gasoline or oil and shuts off the supply of oxygen.

Prevention Skill Objective

Based on the science knowledge, the student will be able to perform prevention skills by:

1. generating a list of safety rules that will reduce fire potential in the home, neighborhood, and school;
2. conducting an environmental survey in school and home to locate potential fire hazards;
3. demonstrating knowledge of escape routes and warning signals;
4. recalling the recommended home fire-fighting equipment;
5. describing the similarities and differences in coping with usual fire hazards in relation to nuclear-war fire hazards.
6. explaining the need for building codes to prevent hazardous conditions;
7. predicting when spontaneous combustion is likely to occur, when shown a series of pictures and given facts about the environment (temperature, wind velocity, etc.).

Preparedness Skill Objectives

Based on the science knowledge, the student will be able to perform preparedness skills by:

1. extinguishing a wood fire in at least two ways;
2. extinguishing an oil, gasoline, paint, or grease fire in two ways;
3. selecting the appropriate extinguishing equipment or method for putting out an electrical fire;
4. demonstrating good judgment in the course of action he chooses when presented with a series of short motion picture scenes of typical fire situations in the home, yard, school, or campground;
5. demonstrating the ability to use alternative procedures when summoning help;
6. demonstrating appropriate actions when confronted with excessive smoke or poisoning gases;
7. demonstrating knowledge of first-aid procedures when he or others are burned;

8. demonstrating what to do if he is trapped by a fire.

Cognitive Process Objectives

Cognitive skills used for decision-making in this and in all units on the prevention of and preparedness for hazardous conditions are:

1. Observing physical/environmental conditions.
2. Analyzing the elements of the situation.
3. Recalling facts and principles.
4. Sythesizing the elements of the situation.
5. Predicting the imminent events.
6. Evaluating alternative actions.
7. Choosing a course of action.

Basic Survival Skill Objectives

Basic survival skills likely to be needed in a fire disaster will, of course, vary with the extent of the disaster. These objectives would be stated behaviorially and become part of the unit or become part of a physical fitness program. (See Figure 2 for skill areas to be included.)

2. SAMPLE CONTENT FOR A GRADE 9 UNIT ON NUCLEAR WAR (GLASSTONE, 1964)

Knowledge Objectives

The student will recall and/or recognize knowledges of the following science facts and principles: (Please note that many new elementary science programs cover energy and transformation of energy in almost this amount of detail. If the ninth-grade student had not been through one of these courses, this detail would not be excessive; if he had, the material to be covered would have to be condensed considerably.)

Energy

I. The Transformation and Conservation of Energy

A. Energy can be changed from one form into another.
B. The production of electricity in a power plant shows very well how energy can be changed from one form to another.
   1. When coal or another fuel is burned, the chemical energy in the fuel is released and changed into heat energy.
   2. The heat energy is used to change water into steam.
   3. The steam then turns a turbine to produce mechanical energy.
   4. The turbine runs an electric generator, or dynamo, that changes mechanical energy into electrical energy.
   5. The electrical energy may then be changed in a light bulb into light energy or it may be changed in the doorbell to sound energy.
C. In all these changes, the energy is not destroyed, but rather changed from one form to another.
D. The law of conservation of energy tells us that energy is neither created nor destroyed, but only changed from one form to another.
E. When energy is changed from one form to another, other forms of energy are also produced.
   1. Usually these other forms of energy are not wanted, and are wasted because we have no use for them.
   2. For example, when we get light energy from an electric light bulb, unwanted and unused heat energy is also produced at the same time.
   3. When we get mechanical energy from a machine, unwanted and unused heat energy is also produced.
   4. When we get heat energy from an electric toaster, unwanted and unused light energy is also produced.

Nuclear Energy

I. Atomic Energy

A. Scientists were able to prove that the atom had a tremendous amount of energy locked up in it when they learned how to split the atom.
B. They found that this energy, which was released when the atom was split, came from the nucleus.
C. At first scientists called this energy atomic energy, but now it is more commonly and properly called nuclear energy.

II. Natural Radioactivity

A. Certain elements, such as radium and uranium, have been found to give off invisible radiations, or rays.
B. These radiations have very peculiar properties.
   1. They can penetrate solid materials, such as paper, wood, thin sheets of metal, and flesh.

2. They affect a photographic negative in exactly the same way as visible light affects the negative when it is exposed to light.
3. They can stop seeds from germinating, kill bacteria, and destroy small animals.
4. A person exposed to these rays for some time will receive servere burns, which take a long time to heal or may even kill the person.

C. Elements that give off these invisible radiations are said to be radioactive, and this highly unusual property is called radioactivity.

III. The Nature of Radioactivity

A. Scientists have studied these radioactive elements and their invisible radiations very carefully.
B. They discovered that these radiations are produced because the radioactive elements are breaking up.
   1. In all cases it has been found that the breakup takes place in the nucleus of the atom.
   2. While the breakup is going on, three different kinds of invisible radiations are given off.
   3. Two of these radiations are really particles of matter, called alpha particles and beta particles.
   4. The third radiation is an energy ray, called a gamma ray.
C. Alpha particles are the nuclei of helium atoms. They have the smallest penetrating power of the three invisible radiations given off by radioactive elements, and can be stopped by a thin sheet of paper or aluminum foil.
D. Beta particles are electrons traveling a high speeds. Because of their high speed, beta particles have a high penetrating power, and a good-sized sheet of aluminum metal is needed to stop them.
E. Gamma rays are high-energy X-rays.
   1. They have more penetrating power than the other two radiations.
   2. Very thick layers of lead or concrete are required to stop them.

IV. The Atomic Bomb

A. The first atomic bomb was tested at Alamogordo, New Mexico, on July 16, 1945.
   1. The bomb had two separate pieces of uranium-235, each piece smaller than the critical size needed to produce a chain reaction.
   2. At the exact moment when the explosion was scheduled to take place, the two pieces of uranium-235 were brought together, making just one piece of uranium equal to or larger than the critical size.
   3. A chain reaction then took place, producing a tremendous explosion and releasing vast amounts of energy.

B. On August 6, 1945, an atomic bomb, also containing uranium-235, was dropped on Hiroshima, Japan.
C. Three days later an atomic bomb containing plutonium was dropped on Nagasaki, Japan.
D. There are four main effects produced by an atomic bomb.
E. One effect of an atomic bomb is the shock wave, or explosive effect.
   1. An atomic bomb destroys everything within 1/2 mile in any direction from where it lands.
   2. Severe damage can be found as far as 1 mile from where it lands.
   3. Some damage can be found as far as 2 miles from where it lands.
F. A second effect of an atomic bomb is the heat radition, or flash effect.
   1. On the spot where the bomb lands, the surface of materials will be heated as high as 5500 degrees Fahrenheit.
   2. Serious burns and fires can be found as far as 1 mile from where the bomb lands.
   3. A noticeable amount of heat can be detected even 2 miles away from where the bomb lands.
   4. Persons looking at the explosion 30 to 40 miles away will be temporarily blinded.
G. A third effect of an atomic bomb is the nuclear radiations given off.
   1. Nuclear radiations, such as gamma rays and neutrons, destroy living tissue.
   2. This kind of damage is quite severe as far as 1/2 mile in all directions from where the bomb lands.
   3. The damage is still severe, but much less so, as far as 1 mile from where the bomb lands.
H. The fourth effect of an atomic bomb is the radioactive fallout, or radioactivity that remains after the explosion.

Prevention Skills Objectives

Since groups of men working together seem to be the only way to prevent disaster from nuclear war, the student will work at the threshold level on what he and his government, others and their governments can do to maintain peace by:

1. hypothesizing the future success of failure of the United Nations or some other world organization in preventing international conflict;

2. hypothesizing the conditions under which a country might feel justified in using nuclear weapons;

3. examining the level of success of the United Nations in its most recent peace-keeping efforts and hypothesizing what international conditions would be necessary for improvement;

4. determining, through a study of the government, what government committees, departments, etc., are involved in work related to the prevention of nuclear war;

5. describing two citizens' groups that work for the prevention of international conflict and assessing their effectiveness.

Preparedness Skill Objectives

Based on the science knowledge, the student will be able to perform prevention skills by:

(Blast Effects)

1. rank-ordering a series of pictures of various structures from least safe to most safe when considering potential over-pressure damage;

2. marking on a series of pictures the safest location to be in when over-pressure occurs;
(stating how)

3. realizing that building codes and construction practices could improve the chances of survival of the occupants of the building.

(Thermal Radiation Effects)

1. selecting the best location, demonstrating body position, and describing the best protective covering in an effort to protect himself from thermal effects when given a series of pictures;

2. describing first-aid procedures for first-, second-, and third-degree burns; temporary blindness caused by thermal effects;

3. realizing that standard fire prevention practices will minimize fire damage;

4. identifying in pictures the materials that are likely to smoulder and rekindle, causing additional fire damage.

(Nuclear Radiation)

1. describing the symptoms of illness from excessive radiation;

2. rating the effectiveness of protective conditions from fallout dangers as good or poor when presented with a set of pictures and

statements of conditions;

3. charting the prevailing winds for his area and predicting the probable direction in which fallout particles would be blown;

4. demonstrating how to get water or food out of a container so that the contents are not contaminated in the process;

5. demonstrating how to decontaminate fresh fruits and vegetables, identifying absorbent types of foods that can not be decontaminated;

6. demonstrating how to get decontaminated water out of a water heater without admitting contamination;

7. demonstrating the distillation of contaminated water.

(Family Preparedness)

1. marking on a map the location of fallout shelters between his home and the school, his home and his friend's home;

2. listing foods he could store that would require no cooking;

3. listing special medicines he or his family members might need and calculating a two-week supply;

4. calculating the amount of water needed for his family for two weeks;

5. listing sanitation supplies and describing procedures to maintain sanitary conditions.

Basic Survival Skills (See Figure 1)

3. SAMPLE CONTENT FOR A GRADE 8 UNIT ON EARTHQUAKES

KNOWLEDGE OBJECTIVES:

The student will be able to recall and/or recognize knowledge of the following science facts and principles:

I. Earthquakes

A. Most earthquakes happen when faulting takes place.
   1. The layers of rock that lie next to a crack, or fault, are pressed very tightly together.
   2. These layers are under very great strain because one layer is usually being pushed in one direction while the other layer is being pushed in the opposite direction.

3. After many years of slowly increasing pressures, there is a sudden movement as the layers of rock slide over one another and come to rest in a new position that eases the pressure.
4. As the rock layers grind against each other when this sudden movement takes place, they set up violent vibrations that can shake large land masses for many minutes.
5. These layers of rock may slip only an inch or so, but the slippage may set up earthquake vibrations that can destroy a whole city.

B. Sometimes the earthquakes and their vibrations take place just below the surface and sometimes they take place deep inside the earth.

C. Although earthquakes may take place all over the earth, they happen most often along two large areas of the earth, called earthquake belts.
1. These earthquake belts are usually areas where high mountain ranges are next to deep ocean floors.
2. It seems as if these areas are weak parts of the earth's crust.
3. One earthquake belt circles the Pacific Ocean, starting with Chile, and going northward to Peru, Central America, Mexico, California, and Puget Sound, then to the Aleutian Islands and Japan, and southward to the Philippines, Indonesia, and New Zealand.
4. The second earthquake belt includes the mountainous areas next to the Mediterranean Sea, a section of Northern Africa, and Asia Minor and southern Asia.

D. Earthquakes that being under the ocean set up huge sea waves, called tsunamis.
1. Tsunamis are mistakenly called "tidal waves."
2. Tsunamis may travel as fast as 500 miles an hour and may be more than 100 feet high when they reach the seacoast.

E. Earthquakes are detected by an instrument called a seismograph.
1. When an earthquake occurs, the vibrations that are produced will travel as waves through the earth.
2. The seismograph detects and records these vibrations and tells us where the earthquake took place and how strong the vibrations are.

Preparedness Skill Objectives

Based on the science knowledge, the student will be able to perform prevention skills by:

1. determining three alternative escape plans and listing them in order of preference when given a specific geographical location with accompanying maps and pictures of the area and a radio message of an approaching tsunamis;

2. describing the appropriate action to be taken by him given a set of post-earthquake disaster conditions (house damaged, large downtown building damaged, etc.);

3. locating and making a diagram of the location of the main electrical service entrance at his home;

4. demonstrating how to cut off the current at a switch-type or fuse-type service entrance;

5. locating the various places in the house where water can be turned off, locating the main water meter, knowing what tool is needed to turn the water off;

6. recognizing the smell of gas or butane;

7. describing the set of actions needed should gas be leaking, describing the location of the gas meter at his home, and identifying the tool needed to turn off the gas supply.

Prevention Skill Objectives

Based on science knowledge, the student will be able to perform prevention skills by:

1. realizing that the state of the earth does not allow man to prevent earthquakes, but that the damage caused by them can be mediated through preparedness;

2. explaining the need for building codes, what institutions of society establish the codes, and who enforces them;

3. knowing the warning signals;

4. generating a list of tools that might be needed following an earthquake, locating the tools where members of the family can easily obtain them.

Basic Survival Skills (See Figure 2)

III. Innovation and Change: The Lessons of the Past

In the contractual outline for this work, we indicated that one possible strategy that could be used to develop a new, successful civil defense curriculum was to examine areas where change would be likely in the public schools over the next decade or two. The assumption was that if we could identify areas in which the schools would be changing in any event, we could "piggy-back" civil defense onto the change. We also indicated that we would look carefully at the areas in which change has occurred during the past decade and try to identify characteristics that typify successful and unsuccessful innovations. The following section integrates these two areas of our study.

Extensive change has occurred in the last few decades. Federal spending on education increased steadily until 1967-68, and the average national per pupil expenditure continues to grow at a rate of 7% each year (Knowledge Venture Group, 1972). In 1964, when Miles reviewed the literature on innovation, he listed a selection of the new programs flowing into the schools from the public and private sectors. There were, for instance, ten curriculum development projects being conducted in science, eleven in mathematics, one in English, two in foreign languages, and four in social studies (Fraser, 1962). Miles refers to Mort and Cornell's (1941) work on the diffusion of innovations, which suggested a fifty-year time span for complete diffusion after the first introduction; he produces more recent evidence that suggests a considerable increase in the 1950's and 1960's over the rate observed in the 1930's . Data on the adoption of programmed instruction and language laboratories,

cited by Miles, indicate 10-20% diffusion where Mort would have predicted 2-3%.

Many of the recent changes in education have been of an additive nature, as more and more subject requirements have been placed upon schools. Some of these changes have been mandated by law in such areas as special education and vocational education. Some of the pressure for change has been of a more informal nature. After the U.S.S.R. orbited Sputnik in 1957, a great deal of pressure was brought to bear to improve and enlarge the science, mathematics, and foreign language curricula of schools in the United States. Brickell (1964) reports that the rate of innovation in these three areas tripled in the fifteen months following the launching of Sputnik, and that all other subjects, including nonacademic ones, also received increased attention.

In the most recent past, ecology and career education have come on the scene as potential major areas of subject-matter emphasis. However, as spending on education accelerates less rapidly (Knowledge Venture Group, 1972), these areas are not "catching on" as dramatically as science and mathematics reform did. Still, if civil defense instruction is to be coordinated with a new curriculum change, ecology would be an appropriate area to focus on.

Most of the change in the last few years has not been in the area of large-scale subject matter. Instead, there has been a wave of individualization with greater impact than is popularly believed (Knowledge Venture Group, 1972). In some cases, formal programs have been developed, such as Research for Better Schools' Individually

Prescribed Instruction (Glaser, 1967). More frequently the tendency has been toward "doing your own thing." Everywhere teachers are modifying their formally prescribed programs to fit their own style and what they believe is the style of their students. We do not yet know whether this adjustment has occurred because of some student unrest and objection to the relevancy of materials or whether it largely results from adult reformers' projecting their interests into those of the students. Nevertheless, a great deal of ferment and activity is being directed toward self-styled, self-made materials. This change is likely to continue. We see no source from which pressure would come to "dump the experimental stuff" and return to a text-dominated, everyone-must-teach-this approach. The high probability we place on this outcome is such that we recommend that if the Defense Civil Preparedness Agency is in doubt as to whether to activate options one and two or three (described in the next section), option three be chosen because it fits most closely with the individualization movement.

What's ahead? We would not pretend to be particularly keen crystal-ball gazers, but there is one area in which future change is fairly predictable. For at least the next decade the schools of the United States will be in a financial crisis. No matter what solutions are found to alleviate the situation, one acquisition area that will continue to suffer is that of new curriculum materials. Teachers' salaries, buildings, and equipment--the capital expenditures--will receive priority over printed and audiovisual materials. As a result, the surest way that DCPA could get its materials used would be to

couple them with other materials the schools already need and to provide them gratis or at very modest cost.

What materials will work best? To answer this question, we can turn to the growing body of research on the diffusion of innovations. The way in which new knowledge, ideas, and products are communicated and received has been studied within the frameworks of rural sociology, communications, and marketing, as well as education. In all the research traditions, attention has focused on the time required for diffusion of an innovation, communicated through certain channels, in a certain kind of social structure (Robertson, 1971).

Perhaps the most interesting findings are those that relate to the intrinsic characteristics of innovations; in a very general way, these characteristics can help us to predict the success or failure of a new product (such as a new curriculum). Havelock (1969, Chapter 8) has organized the factors bearing on an innovation's success, borrowing much of his terminology from Rogers (1962). He notes the importance of scientific status, value loading, complexity, divisibility, communicability, compatibility with the receiver's system, and relative advantage.

Complexity is the most inclusive variable; it can refer to the number of parts in the innovation, or to the difficulty of mastering its use or of maintaining it. In general, an innovation with a high degree of complexity will pose problems of some sort for the adopting system and hence will diffuse slowly. Of course, this variable resists objective definition; what matters is the complexity as perceived by the adopters, and adopters are not all alike.

Other factors may influence the complexity of an innovation with respect to an adopter. Divisibility (that is, the possibility of trial on a limited basis) may bring an otherwise forbidding new product within range for an interested adopter. If it can be broken down into smaller units, or if a few individuals within a social system can test it, it will be likely to diffuse more rapidly. For example, a series of films for classroom use might be more successful if sold individually --and rental might be more appealing than purchase.

The scientific status of an innovation depends on such attributes as reliability and congruence with prevailing scientific theories. Little empirical work has been done to support the significance of this dimension, but for highly-educated adopters "scientificness" may be a determinant (Rogers, 1962); hence, those attempting to influence school authorities should not ignore this factor. In the field of education, science and values interact continually, and so the dimension of value loading should also be borne in mind. Any innovation carries a burden of implicit assumptions, which may require proofs that will be acceptable to the potential users. In the area of civil defense, the public attitudes discussed earlier (Garrett, 1971) indicate that a widespread fatalism about nuclear attack will necessitate some marshalling of evidence that training in survival skills can be critically useful.

Another highly generalized variable is communicability, which relates back to complexity as well as covering adequacy of labeling, visibility, and demonstrability. The successful dissemination of a new product depends on creating widespread awareness of its existence and its effects. One reason for designing an educational innovation

around materials is that they, unlike ideas alone, can be seen and handled.

Implicit in this discussion of intrinsic characteristics is the "fit" between the innovation and the receiver system. Value loading, communicability, and even complexity can be defined only with reference to the norms of the adopter. Compatibility thus becomes a crucial variable. Innovations that require a good deal of change in previous habits of thought and action will probably diffuse slowly.

The adopter of an innovation may be required to expand his operations, to learn new skills, to change his goals or his values. Since these changes can be difficult, compelling reasons must be offered when they are demanded. In fact, some researchers say that innovations should be examined according to the amount of change they require and the nature of the receivers' participation (Lippitt, 1967).

The concept of relative advantage is a manageable one in agriculture or in industry, where profit and loss can be objectively computed. In education, however, costs and benefits have tended to resist assessment. The cost of adoption may be fairly clear, in terms of immediate and long-term financial outlay and psychological discomfort; if these costs are substantial, some reward must be anticipated. The demonstrability of an innovation's merit can be critical here. Furthermore, "an innovation regarded as a means of reducing a well-known (familiar) gap between ideals and practice may achieve adoption." (Miles, 1964, p.638) That is, if the recommended change can be proved effective in solving a recognized problem, schools can probably be persuaded to make the necessary sacrifices to implement it.

When the theoreticians make practical suggestions, they stress the importance of recognizing the way an innovation will be viewed by adopters (Havelock, 1969). The literature suggests that developers of new products should try to reduce complexity, allow for divisibility, and maximize communicability.

While an innovation is in its developmental stages, one especially useful procedure can be the active involvement of potential users. The history of the Biological Sciences Curriculum Study (BSCS) is a case in point; even in the face of the magnitude of an effort to change the approach to secondary school biology to the inquiry method, the BSCS curriculum has had widespread success. The developers of the curriculum were reluctant to engage in any activity that might be construed as aggressive promotion; their dissemination program was essentially limited to responses to questions. However, they obtained a devoted following among high school biology teachers who participated in the developmental effort, either as writers or as testers of pilot versions (Grobman, 1969).

The BSCS experience suggests that when a substantial curricular innovation is being planned, extensive feedback from potential users can be of great value for two reasons. It assures that the adopter's perspective will be known to the developer, as Havelock urges, and it paves the way for the innovation's actual entry into the educational marketplace. Word-of-mouth communication remains critical in the diffusion process (Carlson, 1965), and enthusiastic early adopters provide an easily identifiable model for their colleagues.

In a recent overview of the social change process, Zaltman, et al. (1972) outline a number of factors which must be considered by those who intend to introduce an innovation. They discuss the following components for a change strategy: appraise the target system for its prevailing attitudes and practices; make its members aware of the strategy being directed to them; be sure that there is a felt need for the change; do not overestimate the available resources for sustaining the change; determine whether the target system has significant subsystems (for instance on a regional or a socioeconomic basis); use resources from the system itself if at all possible; and appraise the constraints in the general environment, such as laws and informal social norms.

In conclusion, we also suggest that the history of educational change and the change we can reasonably expect in the future dictate the development of flexible, simple materials that can easily be integrated into existing programs or that can, in effect, replace obsolescent materials that are now used.

IV. Alternatives

Below is a list of options that could be used by DCPA to institute a program for students in grades 7-9. Dollar figures expressed are very grossly estimated; they can be more accurately projected when the number of options has been reduced and quality factors have been evaluated more clearly.

1. Produce a total civil defense program (K-12) to be offered to states and school districts at cost or below. As we estimate it, the start-up cost of this venture would be between $10-50 million, depending on the degree of sophistication desired, the amount of testing required to validate the materials, etc. The maintenance of a program of this scope could easily run $10 million annually if it is to be effective. Of the options presented in this report, this one would be the most effective, though not necessarily the most cost-effective. It would be most effective both in terms of a 7-9 program as well as the K-12 program. In other words, if DCPA wants the most effective 7-9 program possible, the best way to achieve it would be to place it in a K-12 framework. There is ample evidence to indicate that a program working in isolation would be less effective than a program operating in a comprehensive system.

The success of this option is contingent upon the willingness of the Federal Government to subsidize the distribution of materials and ancillary teacher training over a long period of time. Our estimates used to create the $10,000,000 maintenance figure include fifty cents per pupil per year every four years for materials. Though not a princely sum, this figure is more than many school districts now spend in areas

such as reading and mathematics. The key question is whether fifty cents per pupil is too high a price to pay for civilian preparedness.

This option also presupposes the cooperativeness of the states and local schools in installing the program. We believe that if there were sufficient Congressional support for the development of curriculum, the necessary political muscle could be found to get the program installed.

Naturally, there are many alternative ways in which a K-12 program could be formed. Before considering these alternatives, however, we believe it would be more desirable to consider the alternatives to a complete program.

Recommendation: If there is any significant chance that a K-12 program might be a possibility within the next decade, we would recommend that between $100,000 and $250,000 be invested in the design of a plan for such a program. This design could take into account the numerous alternatives that exist for developing such a program.

2. A complete program for grades 7-9 could be produced. We think that the start-up costs for such a curriculum would be $750,000 to $2,000,000, depending on the degree of sophistication desired. The maintenance of this program would be about $1,000,000 a year, including giveaway or subsidized copies of all consumable items.

If designed around existing 7-9 curriculum patterns, the installation of this program could be relatively easy, although a certain amount of political muscle would have to be exercised in certain states. (One way the political muscle could be generated would be for the Director of the Defense Civil Preparedness Agency and/or his key staff

to request time on the agenda of every state board of public instruction. At such meetings, the need for a civil defense program could be presented and a specific plan for developing it could be presented. With the endorsement of state boards, it would be much easier to get the program installed at the local level.)

If this alternative were implemented, it probably should be done as part of a conscious decision to make grades 7-9 the focus for all civil defense training in the public schools. It would be unwise to develop a 7-9 program now, and then later, in an uncoordinated way, develop a 10-12 program. There are good reasons that could be given to justify a 7-9 emphasis. As our previous sections suggest, students in these grades are generally more open and interested in technical matters related to survival. The success of the Scouts with children in this group, rather than with older children, is a good precedent to study. By the time the children are in high school, they have other, more social interests that detract from much of the individualistic nature of a civil defense program. This is not to say that a 7-9 program should be developed in isolation. Certainly not. A 7-9 program would have to be part of a K-12 plan that prepares for (grades K-6) and maintains (grades 10-12) the program fully developed in grades 7-9. But the basic substance of the curriculum would be focused on the junior high years.

Recommendation: If this is the preferred alternative, we recommend a commitment of between $150,000 and $500,000 to design the program and its installation plan.

3. Instead of the production of a complete curriculum an alternative would be a series of modules or mini-units that could be adopted independently of and/or in conjunction with existing curriculum in such areas as science, physical education, and social science. An important part of this recommendation would be that the development of these units be part of a 7-12 plan. Many units with modified instructions and/or special supplements could be used at several grade levels. The cost of this option is difficult to estimate because it could be implemented at various levels. We would suggest that the minimal start-up investment should be $1,000,000. This figure would provide a more expensive plan than option two because of the need to build flexibility into all units.

The installation/maintenance costs would also be higher than for option two becuase a great deal more teacher training and installation support would be necessary. In the long run, it could be as successful as option two, or even more so.

A second form of this option would be to develop modules that could be used together as a total 7-12 program, as a 7-9 or a 10-12 program, or as materials that could be used independently. This option would be considerably more expensive, however, requiring as much of a commitment as option one.

One of the reasons for choosing option three over one or two would depend upon the degree to which those responsible for civil defense believe they can be effective in getting the cooperation of state governments and local school district officials in agreeing to support a civil defense program in their states and schools. If DCPA believes this cooperation will be substantial, then options one and two would be

preferable to option three. If there will be little cooperation or if it will be of a perfunctory nature, then we would recommend option three. The question is really one of "locus of control." As it is now, in areas where there is no state-mandated curriculum, the locus of control or power to decide what shall be taught is in the hands of individual teachers, department heads, and, in some cases, principals and superintendents. (The reverse is true in grades K-6 where the locus of control is usually in the hands of principals, central office staff, and superintendents.) Unless Civil Preparedness authorities can create a situation in which civil defense curricula are mandated in most schools through state and local policies, there is very little chance that options one or two can succeed. Option three would have a better chance of working because the materials could be adopted and adapted to the needs of the individual teachers who have the ability to make curriculum decisions.

Recommendations: Those responsible for the management of the Civil Preparedness program should make a careful assessment of their ability to influence state and local educators. An independent study of the current status should be conducted. If this study reveals a minimal ability on DCPA's part to influence educational curriculum policy decisions at the state and local levels, a planning effort could be undertaken along the lines suggested by alternative three.

4. Instead of curricula per se, another alternative would be to develop curriculum frameworks, guides, and/or behavioral objectives, and/or tests. The guides or plans could be developed in coordination with state curriculum frameworks. The assumption behind this model is that since

schools tend to "do their own thing" anyway, it would be best to let them continue; to direct their efforts toward the objectives of civil defense, however, they should be given adequate guidelines, etc. This "helping" should probably extend to making appearances at curriculum conferences, personal calls on curriculum writers, etc. Paying the writers a small fee for submitting their plans back to DCPA would also be a motivational device. We estimate that the start-up cost of this effort would probably be on the order of $150-200,000 and the maintenance cost would be about one to two million dollars.

One element that should be included in this alternative is the development of performance objectives or behavioral objectives. (See Chapter II for a definition.) A set of performance objectives is a powerful unifier becuase it specifies exactly what the student will be able to do when he has completed a given unit. These are for the most part learner-active experience-based objectives, but depending on how they are written they may indicate a program that is lecture-oriented, experience-based, or learner-passive. Though frameworks usually contain some general goals, a full set of goals and objectives specifies the degree of student attainment that defines what is to be taught.

The writing of successful goals and objectives is a very critical affair, for they must not only be reasonably attainable, appropriate to the grade level, interlocked with those of other grade levels, and necessary to the subject matter, but also be implementable by the teacher. In other words, if the teacher feels the program takes up too much school time, if he cannot find support materials, if he feels none of his students could learn it--civil defense education is not likely to be successful.

We would suggest that the guidelines and objectives be developed in conjunction with their dissemination. In other words, an important way to gain the support of or co-opt the educational establishment is to ask its practitioners to participate in the writing of curriculum guidelines, etc., for the elementary or secondary school. If this task is handled well, those involved will become committed to the project and implement many ideas as part of their own teaching.

The vehicle for implementing this alternative might be summer workshops. It would keep teachers employed during those months and that alone would be a powerful motivator. Other incentives would be: inservice workshops to learn how to write objectives, etc., where civil defense, somewhat arbitrarily, is the subject matter of the lessons. One could also sponsor small awards for curriculum projects that develop out of the experience of those writing guidelines.

Recommendation: If those responsible for managing the national civil preparedness program are somewhat hesitant about implementing the other alternatives presented here, this option would be the best place to start. If carefully controlled, it could generate outlines that could later be used in curriculum development. It could also provide a major test of the willingness of state and local policy-makers, as well as teachers, to use civil defense materials. This alternative could also be implemented on a smaller scale without heavy commitment to follow through.

5. Rather than the building of new curricula or the setting up of curriculum guidelines, another major alternative for implementing the goals of DCPA would be to invest heavily in teacher training. On the assumption that a lot of materials on civil defense already exist and

that teachers have ways of getting new ideas into the curriculum without requiring large amounts of new materials, teacher training could become significant way to bring civil defense to the attention of children. The costs of this kind of program would not be small. In effect, an entire curriculum would have to be developed for teacher training itself. Developing this material would be almost as involved as developing curriculum materials for students. We estimate the start-up costs to run from $500,000 to $1,200,000. Maintenance costs would be about $150,000-500,000 per year.

It is difficult to estimate the relative effectiveness that this program would have. The National Science Foundation has had considerable success in running summer teacher training programs. The success of these programs must be attributed, in part, to the inservice or college credit that teachers get for attending the program, the general prestige and professional identity that exists for science, and the fact that there were specific new programs that teachers watned to come to learn how to use. Many of these pluses for NSF would not exist for DCPA.

6. Miscellaneous Alternatives. In developing the preceding five recommendations, we considered a wide range of other alternatives, which we have listed in Appendix A. As we continued to study the feasibility of a 7-9 program, these miscellaneous ideas appeared to be small, activity-oriented projects that would not by themselves produce long-range results. They could be undertaken as OCD has undertaken other small projects before. Indeed, some of them could be incorporated into some of the larger alternatives described above.

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APPENDIX A

SMALLER-SCALE RECOMMENDATIONS

The first several alternatives represent activities that could be undertaken in conjunction with Far West Laboratory products. The remainder are projects that would capitalize on various innovations and ideas currently having impact on schools. Because of their lack of comprehensiveness, these projects do not speak to the broader problems which we believe must be solved.

Minicourses

An innovation in teacher preparation is microteaching. Minicourses use videotape recording technology and microteaching to provide a teacher with teaching skills. Each minicourse provides all the instructional materials needed for a teacher to learn a specific set of skills.

Each Minicourse consists of filmed or taped instructional materials plus hand-books, evaluation forms, daily course schedule and other needed course materials. A teacher sets aside an hour each day for a week for microteaching and reteaching in a small room with a small group of students. At this time, the teacher practices the skills she has seen demonstrated on film. In each microteaching session, she videotapes her own performance and then evaluates her efforts.

Five Minicourses have been developed by Far West Laboratory and almost twenty more are under development for teachers at all grade levels. The courses are currently being used in in-service programs in both small and large school districts and for pre-service teacher

preparation in colleges and universities.

There are two proposed uses for Minicourses in the disaster preparedness effort. A Minicourse on disaster preparedness could be developed to provide pre-service and in-service training of teachers. The teachers employing the microteaching method would learn the teaching skills for materials on disaster while using the Minicourse.

A Minicourse developed by Far West Laboratory could be used to teach instructors skills to deal with potentially controversial issues such as civil defense in the classroom. The goal of Minicourse 14, "A Discussion Approach to Controversial Issues," is to develop teacher-pupil skills in discussion as well as a critical appraisal of controversial social issues.

CONFRONTATION

CONFRONTATION is a human relations training unit developed by Far West Laboratory in the form of a simulation game for teachers and administrators in a multi-ethnic school. This simulation game has open-ended films so designed that the participants may analyze specific kinds of interpersonal problems, and propose and find methods of implementing solutions. The confrontation training unit is a complete package of audio-visual and written materials.

Open-ended incidents are recorded on 16mm black and white sound film. When each incident ends, a question mark appears on the screen. The projector may be stopped to permit participants to note their reactions. The second half of each film is directed to the discussion leaders. That is, it is geared to train them in the techniques of guiding participants through constructive analyses, understanding and implementation.

The filmed episodes cover:

1. How institutional procedures and attitudes of school personnel might alienate visitors to a school;
2. How a teacher's words and expressions in the classroom might sound offensive, even though they were intended to be positive;
3. How a teacher's application of school rules might affect teacher-student relations; and
4. How a teacher's methods in dealing with civil rights issues in classroom discussion can result in confrontation situations.

There are several possible uses for the CONFRONTATION training unit in the disaster preparedness effort. The development of an open-end disaster training unit would show some of the human relations problems that might arise in a public shelter after a disaster, for example, in interactions between people of different racial or ethnic backgrounds. The CONFRONTATION training unit could be modified to teach a variety of human relations skills.

Instructional Planning and Management Training Package

At Far West Laboratory three self-contained training units are nearing completion of development in the Instructional Planning and Management System. These units constitute a training package on instructional planning.

The Problem Analysis training unit encourages school planners to study problems and indicate their importance before considering alternative solutions or implementing a new program. The purpose of this

unit is to compare the seriousness of problems competing for attention where there are limited resources.

The purpose of the Goal-Setting training unit is to guide instructional planners in determining what the district's goals are and what they mean. The last training unit is the Deriving Curricular Objectives unit. This training unit helps one translate his goals into appropriately stated objectives. These objectives are used in planning and developing evaluation plans against which objectives of instructional programs can be assessed.

It is proposed that these training units be used to train personnel to develop a basic survival skill curriculum. These training units might also be modified to help other Civil Preparedness personnel to develop these important skills.

Information Units

Information Units contain detailed and summarized information about new programs as well as descriptive material about a wide range of programs and projects. Each unit also includes a review of innovative educational trends in the subject area to assist the decision maker in evaluating alternative programs.

An information unit covering survival skill programs and projects is proposed. Objective summarized information would be available covering the best-developed innovative programs which emphasize survival skills in disaster situations. An information unit could be effectively used for curriculum decision-making, in-service training programs, pre-service education, staff involvement, community participation and public information.

Year-Round Schools

Year-round or extended year school programs have many designs. Each one of these programs or designs has advantages and disadvantages as it is adapted by individual communities. In most of them, students go to school for twelve months out of a year instead of the usual nine months.

Since school teachers in such programs would be working year-round, they would not have as much time to devote to curriculum development as they do presently. It proposed that DCPA provide curriculum in the major subject areas which would include some of the basic survival skills.

Non-Graded Schools

Non-gradedness is an approach to individualized instruction which creates flexibility in the school setting. At present, there are two major commercial programs which emphasize individualized instruction: Individually Prescribed Instruction (IPI) developed by Research for Better Schools, Inc., and Planned Learning Approach to Need (PLAN) developed by Westinghouse Learning Corp. Since nongraded schools and the commercial programs require a wide choice and range of materials, it seems that additional and corresponding materials might be developed. If these materials conveyed the basic survival skill message for civil defense these skills would be taught to the students.

Enrichment Materials

Enrichment or supplementary materials are alternative course materials that one might use to teach students. Crossword puzzles,

coloring books, numbered coloring pictures, and math problem sets are a few examples.

Enrichment materials concerned with civil defense could be developed. For example, problem sets for mathematics teachers might center around shelter management. Each problem would teach a survival skill with questions such as, given the average area a person would require, how many people would fit into a room of a given size? Other problem sets could be generated covering many different aspects of civil defense.

School Bus Television

In the past decade bussing of elementary and secondary school students has increased for various reasons, including the attempt to desegregate public schools. During this same period there have been technological advances in the field of television. It has been proposed to provide school buses with a television set and headsets for each student. Different sorts of survival skills could be among the material taught while the students are being transported from home to school and back.

Film-Making

During the last decade film-making by junior and senior high school students has increased. Some schools even offer courses in film-making. An approach to encourage the learning of survival skills would be to provide students with film-making equipment and materials to make films where disaster situations were emphasized.

The students, under the direction of the teacher, would write the script, do the acting, shoot the scenes, and edit the film. The films

could be presented to local, regional, and national judges to select the best film presented. Winners of the contest would be awarded scholarships.

A special teaching aid such as a short film on film-making could be provided in the kit. If one wanted to cut down on the initial expenses, darkroom materials would not be provided. The film-makers kit would have an 8mm movie camera, 8mm film, a make-up kit and a film-maker's guide.

Clusters

The cluster in education is an integration of two or more subject areas that may or may not relate to each other. The lessons taught by teachers are correlated as much as possible so that important concepts are emphasized.

Students in a cluster are chosen on the basis of their difficulties in one or both subject areas. For example, if a student is having problems in science and reading, the student would be programmed into an English/Science cluster. The student would receive science concepts in the English course and reading skills in the science course.

Clusters could be developed to teach basic survival skills by integrating these skills into a Science/Home Economics cluster, a Home Economics/Physical Education cluster and Science/Physical Education cluster.

Teaching Machines

A teaching machine is an instructional mechanism used to produce systematic behavioral changes in a student. The student's response to the materials presented determines the mechanism's operation. There are two types of teaching machines, the manual and the computerized (computer aided instruction).

An ideal teaching machine is controlled by a computer that not only controls the frame presentation, but is also capable of diagnosing the needs of the student, and is thus the mechanical equivalent of an effective teacher.

It is proposed to develop a manual or computerized system which would teach students basic survival skills. Such a system would provide the student with immediate feedback, thus reinforcing what is being learned. For example, a student learning the correct procedures in a poisoning situation is given the name of a poison with the names of four different antidotes and is asked which antidote he would administer. If the student's answer is correct, he moves to the next question. If his answer was incorrect, the system branches to a tutorial mode, reteaching the correct choice of antidotes to use in different sorts of poisoning situations.

Social Studies Curriculum Units

In the past most of the civil defense social studies curriculum units developed have been oriented towards disasters resulting from nuclear attack. They have covered such topics as shelter management and how to count different sorts of radiation.

Instead, social studies units could be given an environmental orientation. These units would teach basic survival skills needed in case of various natural or man-made disasters, ecological as well as nuclear.

Civil Defense Mobiles

Over the past decade there have been an increasing number of mobile demonstration units or sites.

These are useful for reaching a target audience and giving some acquaintance with their subject matter. A mobile unit dealing with basic survival skills could travel widely, imparting awareness of these skills.

APPENDIX B
DOCUMENT SEARCHES

Defense Documentation Center

These references were provided in a Report Bibliography from the Defense Documentation Center, Defense Supply Agency, Cameron Station, Alexandria, Virginia 2314 (Search Control No. 073359). The descriptor used was "disaster training in public schools." The references given here are those that were judged pertinent in a review of the bibliography by a technical specialist.

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